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UNITED STATES DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN

WASHINGTON, D. C. 762 OCTOBER 21, 1916

Contribution from the Bureau of Entomology, L. O. Howard, Chief.

THE FALSE CHINCH BUG[1] AND MEASURES FOR CONTROLLING IT.

By F. B. MILLIKEN, *Scientific Assistant, Truck Crop and Stored Product Insect Investigations.*

INTRODUCTORY.

The grower or gardener of the plateau region east of the Rocky Mountains is often alarmed to note that his sugar beets or cabbages, which a day or two previously had been apparently free from insects, are swarming with minute, active, grayish bugs which, by their numbers, threaten the profitable harvesting of his crop. These insects belong to the species commonly known as the false chinch bug.

FIG. 1.—The false chinch bug (*Nysius ericae*): Adult at right, last stage of nymph at left. Highly magnified. (Adapted from Riley.)

A severe outbreak of this pest, especially in Kansas and Colorado, during May and June, 1916, makes it desirable to inform market gardeners and sugar-beet growers of the best means that have been developed for combating it in that region. The ability to recognize the insect when it appears and a knowledge of its life history and habits are essential to the successful application of remedial measures.

The adult false chinch bug (fig. 1) is about one-eighth of an inch long and one-twentieth of an inch wide, or about half the length and half the width of a grain of wheat. To one familiar with the true chinch bug it is sufficient to say that the false chinch bug resembles it, including the offensive odor, but is more slender, and there is no

[1] *Nysius ericae* Schill. (*N. angustatus* Uhl.); family Lygaeidae, order Hemiptera, suborder Heteroptera.

black on the wing covers. Others will recognize the insect from the description given above and its dull gray body, which is black beneath and half covered by its whitish wings. The young are wingless and may be recognized from their occurrence with the adults.

GENERATIONS AND FOOD HABITS.

The number of generations, or "broods," produced annually depends upon the temperature, the latitude, and the season. At Garden City, Kans., there are at least five. The early spring and the late fall broods deposit their eggs in the surface cracks of the soil and in pulverized soil. During the hottest weather they thrust their eggs among the clustered parts of plants, such as the heads of the great-flowered gaillardia,[1] the flowering parts of carpet-weed,[2] and the glumes of "stink-grass" or strong-scented love-grass.[3]

When the young are hatched they feed almost exclusively on weeds, especially on pepper-grass,[4] shepherds-purse,[5] thyme-leaved spurge,[6] Russian thistle,[7] and sage-brush.[8] *Monolepis nuttalliana* (R. & S.), which has no common name, is also included in the list of food plants. At maturity the adult bugs scatter over all vegetation. If drought prevails they are compelled to gather on cultivated crops, preferring crucifers or cole crops and beets, but they have been observed feeding on corn and kafir. Seed beets during the second year's growth suffer especially.

While feeding, the false chinch bugs congregate in large numbers on a few plants. Here they remain until the sap is exhausted and the plants wilt, after which they collect on such other plants as are growing close by. When disturbed, the adults dart quickly to the ground or to adjoining plants. Those alighting on the ground crawl to plants when the disturbance ceases.

CONTROL MEASURES.

DESTRUCTION ON WILD PLANTS.

The false chinch bug may frequently be controlled by destroying it on its wild food plants, and since the effect on such plants need not be considered, this may be accomplished satisfactorily by burning, which is particularly effective when there is enough dead and dry vegetation on the ground to carry fire. This will compass the destruction of many of the adults as well as great numbers of the young. Burning may be facilitated by scattering straw or similar dry material over the infested area, and when the insects are massed on weeds or clumps of wild vegetation they can be destroyed by the use of a strong-blast gasoline torch. The best type of torch, costing

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[1] *Gaillardia pulchella* Foug.
[2] *Mollugo verticillata* L.
[3] *Eragrostis major* Host.
[4] *Lepidium virginicum* L.
[5] *Bursa bursa-pastoris* L.
[6] *Chamaesyce serpyllifolia* Pers.
[7] *Salsola tragus* L.
[8] *Artemisia tridentata* Nutt.

about $18, should be employed for this purpose. The ordinary plumber's torches are not satisfactory for field work, as they are almost certain to become overheated so that the operator can not use them, and in a short time the heat destroys their usefulness. The value of hand torches for insecticidal purposes is extremely limited, and growers are apt to expect too much from their use. They are applicable to only a few forms of insects, of which the present species is one.

DESTRUCTION BY CONTACT POISONS.

Adults which attack cabbages or sugar beets are readily killed by a spray of about 1 pound of fish-oil soap or strong laundry soap to 5 gallons of water. On turnips and radishes such a solution is too strong, and a solution of 1 pound of soap in 10 gallons of water with 1 part of nicotine sulphate in 1,000 parts of water should be used. Other crops whose resistance to strong soap solutions is not known should be treated with the latter solution. Those insects that survive the first treatment soon collect on other plants, where they may be destroyed by another spraying.

To spray an infested plant successfully it must be approached without disturbing the bugs and the nozzle held high enough above it to allow the cone of spray to surround the plant. The spray should then be turned on and the nozzle gradually lowered in order to wet the bugs on the ground, after which it should be directed among the leaves to wet those which are sheltered. It is best to attach the nozzle to the end of a 4-foot rod, and to set it at right angles to the rod by means of an elbow.

CAPTURING THE BUGS ON STICKY SHIELDS.

A sticky shield for capturing the false chinch bug on plants that can not be sprayed has been developed by Mr. H. O. Marsh, of the Bureau of Entomology, and Mr. W. W. Tracy, jr., Bureau of Plant Industry, working at Rocky Ford, Colo. This shield consists of burlap, or gunny, stretched over a back of thin boards and protected by poultry netting which is tacked to end pieces 1 by 4 inches. Crude petroleum is spread on the burlap and sprinkled with kerosene to soften it. The shield is then held alongside the infested plant and the bugs driven onto it by striking the other side of the plant with a beater made of a piece of canvas tacked to a flat handle. The netting prevents the plant from brushing the oil off of the shield, but does not interfere with the bugs darting against it and sticking in the oil, or at least becoming sufficiently smeared to insure their death. The diagram (fig. 2) illustrates the construction of a shield and beater.

A convenient size of shield is 24 by 30 inches, and of the beater, 14 by 14 inches. Such a shield can be operated by one man, but better results can be secured by two. The petroleum and kerosene must be renewed frequently.

To combat this pest successfully and to prevent losses to his crops the grower should apply remedies at the very beginning of an attack. If the outbreak covers a large area, all growers in the locality should cooperate, as crops may be attacked anywhere in the neighborhood.

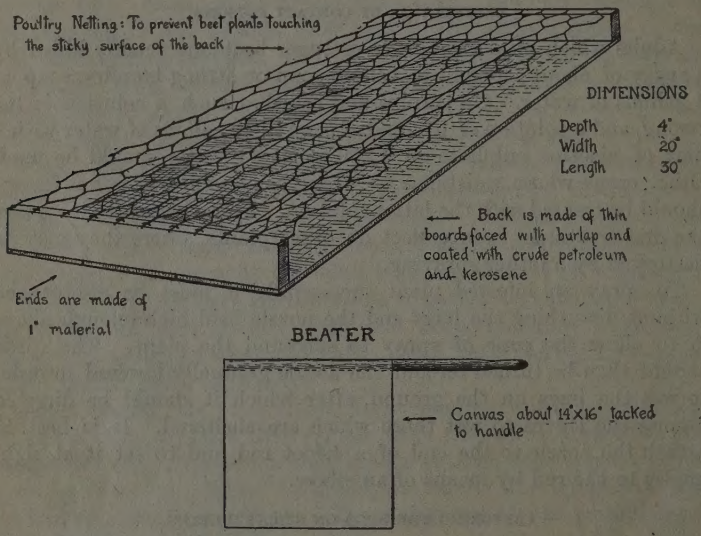
Poultry Netting: To prevent beet plants touching the sticky surface of the back
DIMENSIONS
Depth 4"
Width 20"
Length 30"
Back is made of thin boards faced with burlap and coated with crude petroleum and kerosene
Ends are made of 1" material
BEATER
Canvas about 14"x16" tacked to handle

FIG. 2.—Sticky shield and beater for destruction of false chinch bugs on flowering beets. (Original.)

After the adult bugs have collected on a certain area, their destruction will usually end the damage by that brood. However, if others of the same or of succeeding broods are driven on later by the dying of adjacent vegetation, another application of remedial measures will be necessary. The more completely the earlier generations in a given year are destroyed, the less will be the damage by later generations during the same year; and the more thoroughly control measures are practiced during any year, the less is the danger of severe outbreaks the next year.

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WASHINGTON, D. C. 763 NOVEMBER 29, 1916

Contribution from the Bureau of Entomology, L. O. Howard, Chief.

ORCHARD BARKBEETLES AND PINHOLE BORERS, AND HOW TO CONTROL THEM.

By FRED E. BROOKS,
Entomological Assistant, Deciduous Fruit Insect Investigations.

INTRODUCTION.

This bulletin gives a brief account of the principal barkbeetles and related species that attack apple, peach, plum, and other orchard

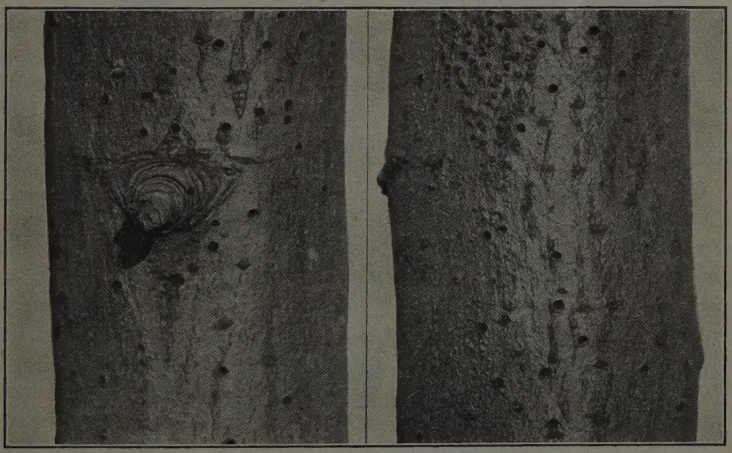

FIG. 1.—Exit holes of the fruit-tree barkbeetle in sections of trunk of young apple tree. About natural size. (Original.)

trees and describes the methods most effective in controlling them. These troublesome insects are small beetles which belong to two

NOTE.—This bulletin is of interest to fruit growers generally, especially in the territory east of the Rocky Mountains.

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groups: First, and most commonly injurious, the shot-hole borers or barkbeetles; second, the pinhole borers or ambrosia beetles. To the first group belong the fruit-tree barkbeetle[1] (fig. 2), which occurs throughout the United States east of the Mississippi River, in many localities farther west, and in Canada, and the peach-tree barkbeetle[2] (fig. 7), which has been found in the States of New Hampshire, New York, Pennsylvania, Maryland, the Virginias, North Carolina, Ohio, and Michigan, and in Ontario, Canada; to the second group belong the apple wood stainer[3] (figs. 14, 16) and a related species[4] (fig. 15), and the pear-blight beetle[5] (fig. 17), of the Eastern United States. The species which are the most generally distributed members of the two groups in the United States and those of greatest importance from the standpoint of injury to deciduous fruit trees[6] are discussed in the following pages. Each of them attacks several kinds of fruit trees, although the peach-tree barkbeetle appears to infest only the trees that bear stone fruits.

NATURE OF INJURY CAUSED BY SHOT-HOLE AND PINHOLE BORERS.

The shot-hole borers or barkbeetles burrow into the bark and slightly into the wood in both the larval or grub stage and the adult or beetle stage and, by extending their burrows in great numbers between the bark and sapwood, destroy that vital part of the tree known as the cambium. As a rule, sound, vigorous bark is not attacked, injury being confined to such trees as have had their normal health impaired by some other agency. Cases are not unknown, however, in which the beetles have multiplied greatly in diseased and dying wood and have then extended their attacks to near-by healthy trees, causing extensive loss. The female beetles, in entering the bark to deposit their eggs, and, also, all the newly transformed beetles in leaving their pupal quarters in the wood, make small but rather conspicuous round holes in the bark. Numerous punctures of this kind very frequently appear in trees within a short time after they have been seriously weakened or vitally injured by some cause not connected with these insects. On account of the fact that these entrance and exit holes are apt to attract the attention of orchard owners, it is probable that the loss of trees is sometimes attributed directly to injury by barkbeetles, when, in reality, death is due primarily to some weakening of the trees caused by root or crown dis-

[1] *Scolytus rugulosus* Ratz. [2] *Phloeotribus liminaris* Harris. [3] *Monarthrum mali* Fitch. [4] *Monarthrum fasciatum* Say. [5] *Anisandrus pyri* Peck.

[6] Another species, *Stenoscelis brevis* Boh., of somewhat similar appearance but belonging to another family of beetles (Calandridae), is frequently received from fruit growers who suppose it to be injurious. This insect is common in dead wood of apple and some other trees. The beetle is black and about one-eighth of an inch in length. The larva is white and has a row of minute black spots on each side So far as is known at present this species does not feed in living wood and therefore does not occur in orchards of perfectly sound trees.

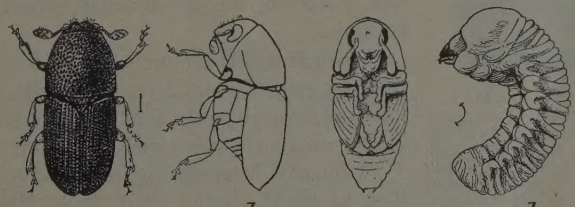
eases, overbearing, starvation, injury to roots or base of trunk by other insects, mice, or rabbits, injury by the San Jose scale, or some other cause more or less obscure.

The pinhole borers or ambrosia beetles, which are somewhat similar to the foregoing in size, color, and form, penetrate farther into the wood than do the barkbeetles, and, like them, prefer to attack diseased or dying trees. Beetles of this group sometimes bore into the twigs of live apple and pear trees, causing a dying back of the tips as though from twig blight. They have also been recorded as injuring nursery trees by boring into the trunk and causing that part of the tree above the point of injury to die.

THE FRUIT-TREE BARKBEETLE.[1]

HISTORY AND GEOGRAPHIC RANGE.

The fruit-tree barkbeetle, or shot-hole borer (fig. 2), probably was introduced accidentally into America from Europe some time pre-



a *b* *c* *d*

FIG. 2.—The fruit-tree barkbeetle (*Scolytus rugulosus*): *a*, Adult, or beetle; *b*, same in profile; *c*, pupa; *d*, larva. All enlarged about 10 times. (Chittenden.)

vious to the year 1877. The insect is now known to occur throughout practically all the United States east of the Mississippi River, and has become established in many localities to the west and also in Canada, although it does not appear at the present time to have reached the Pacific Coast States.

TREES ATTACKED.

The fruit-tree barkbeetle attacks and breeds in most of our cultivated deciduous fruit trees and in several species of uncultivated pome and stone fruits. The list of food plants is known to include apple, pear, plum, peach, cherry, quince, apricot, nectarine, wild cherry, chokecherry, wild plum, mountain ash, loquat, and service berry. Under favorable conditions multitudes of the beetles may develop in the wild trees mentioned and migrate in destructive numbers to near-by cultivated orchards.

LIFE HISTORY AND HABITS.

The adult, or beetle (fig. 2, *a*, *b*), is about one-tenth of an inch in length and of a dark brown or black color with dull reddish mark-

[1] *Scolytus rugulosus* Ratz.; order Coleoptera, family Scolytidæ.

ings on the legs, about the head, and on the tips of the wing covers. In the spring, from April to June, according to latitude, the beetles appear on suitable trees and begin to excavate brood chambers between the bark and sapwood. In preparing the chamber the female beetle gnaws a round hole, about one-twentieth of an inch in diameter, through the bark and then extends a slightly enlarged burrow (fig. 3, *a*), 1½ or 2 inches in length, nearly or quite parallel with the grain of the wood. This burrow or brood chamber is made partly in the bark and partly in the wood, and during the process of its construction small niches are mined out on both sides, in each of which a minute white egg is deposited. A single female will produce, on an average, from 75 to 90 eggs.

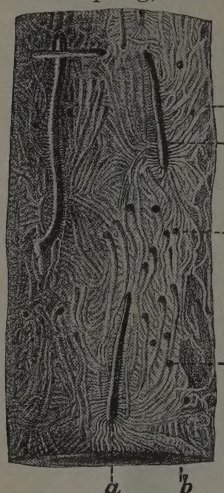


FIG. 3.—Galleries of the fruit-tree barkbeetle on twig under bark: *a*, *a*, Main galleries; *b*, *b*, side or larval galleries; *c*, *c*, pupal cells. Natural size. (Ratzeburg.)

The eggs hatch in 3 or 4 days. The small, footless, grublike larvæ are white with reddish heads and attain, when full grown, a length of about one-tenth of an inch. The larvæ (fig. 2, *d*) burrow between the bark and sapwood, first at right angles away from the brood chamber, and form centipede-like figures in the wood which are disclosed by removing the bark. (Fig. 4.) The larval burrows when completed average 3 or 4 inches in length and are filled with dust-like frass of a reddish-brown color. After feeding from 30 to 36

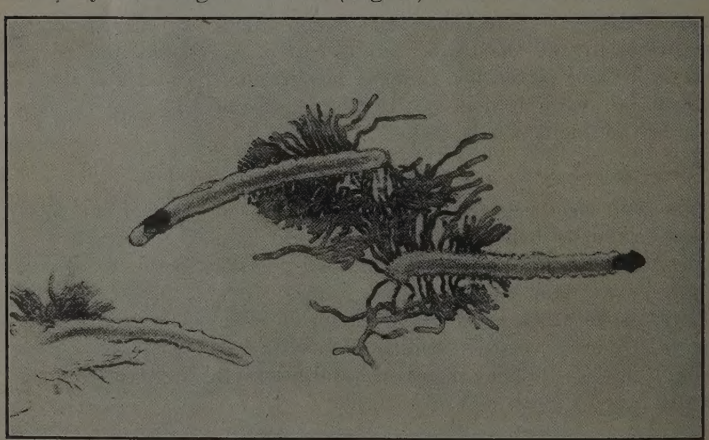


FIG. 4.—Galleries of the fruit-tree barkbeetle under apple bark, showing adult females in brood chambers. Enlarged. (Original.)

days the larvæ attain full growth and pupate within specially constructed cells just beneath the surface of the sapwood.

The pupal period (see pupa, fig. 2, *c*) lasts from 7 to 10 days, and at its termination the beetles that have developed gnaw out through the bark, making their escape through small, round holes (fig. 1) similar to the entrance holes made previously by the females.

Within a few days after emerging these young beetles begin to deposit eggs, giving rise to a second brood of larvæ which feed in the trees during the latter part of the season. In approximately the northern half of the territory over which this barkbeetle is found the second-brood larvæ winter in the trees, pupating early in the spring following. In the southern part of the territory, however, these larvæ become adults before winter, escape from the trees, and deposit eggs, providing thereby for a third brood of larvæ. Thus, in the Northern States there are two generations of the insect annually, while in the South three and possibly four generations may occur within the year.

FEEDING HABITS.

Except in cases where the barkbeetles are excessively abundant, they do not normally attack and breed in healthy trees, neither do they feed and deposit their eggs in wood that is entirely dead. Trees that have been greatly weakened by unfavorable conditions, or that are in the act of dying, afford the most acceptable food for the beetles and their larvæ. Where there is a great quantity of dying wood, such as prunings and trees that have been injured by the San Jose scale, the yellows, freezing, or root troubles, the beetles will breed in great numbers, and after their supply of preferred food has been exhausted they will sometimes attack vigorous trees that may be growing in the vicinity. At first the attacks may not make much impression on sound trees, but a continuation of the injuries may eventually weaken the trees to such an extent that they become acceptable food for the larvæ, which can then develop within the bark, and after this the death of the tree is reasonably sure to follow very soon.

When healthy peach, plum, cherry, and other stone fruit trees are attacked, the flow of gum (fig. 5) will often check the entrance of the beetles and will prevent the development of larvæ in cases where eggs are deposited. The formation of gum at the wounds will diminish, however, as the tree is weakened, and after a period during which slight but numerous injuries have been inflicted by the beetles the condition of the tree may become exactly right for the deposition of eggs and the growth of the larvæ. The trunk, branches, and twigs of suitable trees are attacked and all the inner bark and the

surface of the sapwood converted to dust in a very short time by the primary wounds of the beetles and the more extensive burrows of the numerous larvæ. (See fig. 6.)

NATURAL ENEMIES.

Several kinds of four-winged insect parasites attack and destroy the barkbeetle larvæ, probably the most abundant and effective being a small species known technically as *Chiropachys colon* L. Minute nematode worms of an undetermined species have been found inhabiting the bodies of the larvæ, but to what extent, if any, they reduce the number of insects, has not been determined. Among the birds, woodpeckers remove many of the insects from infested trees, especially during the winter months.

FIG. 5.—Gum exuding from wounds on peach limb caused by the fruit-tree barkbeetle. Reduced. (Original.)

THE PEACH-TREE BARKBEETLE.[1]

HISTORY AND GEOGRAPHIC RANGE.

The peach-tree barkbeetle (fig. 7) is a native of America and has been recognized as an enemy of peach trees since about the year 1850. It first came into prominence as a supposed cause of the disease of peach trees known as "yellows," a supposition which was not borne out by subsequent investigations. The insect is very similar in form and habits to the fruit-tree barkbeetle, although it does not attack so great a variety of trees. Peach, cherry, and wild cherry are its principal food plants, although it is known to work on plum when no other food is available.

FIG. 6.—Twig of apple killed by the work of the fruit-tree barkbeetle. Natural size. (Chittenden.)

At the present time the species is known to occur in the States of New Hampshire, New York, Pennsylvania, Maryland, Virginia, West Virginia, North Carolina, Ohio, and Michigan,

[1] *Phloeotribus liminaris* Harris; order Coleoptera, family Ipidae.

and in the Province of Ontario, Canada. It is probable that it may be found in States other than those mentioned.

As a rule, this beetle, like the one described previously, prefers to attack diseased and dying wood, and the known cases of serious injury by it to healthy orchards are not numerous. There are records, however, of its doing great damage to peach orchards in Ohio, New York, and Ontario, and the history of the species indicates that where breeding conditions are favorable it may multiply and become at any time a menace to peach, and possibly cherry orchards.

LIFE HISTORY AND HABITS.

Unlike the fruit-tree barkbeetle, this insect winters in the tree as an adult. This adult, or beetle (fig. 7, *a*, *b*), is a little less than one-tenth of an inch in length and in color light brown to nearly black. Some of the beetles, which transform to the adult stage late in the fall, winter within their pupal cells in dead or dying trees; others, which transform earlier in the fall, leave the host tree and bore into healthy or unhealthy trees, forming hibernation cells just beneath the outer layer of bark.

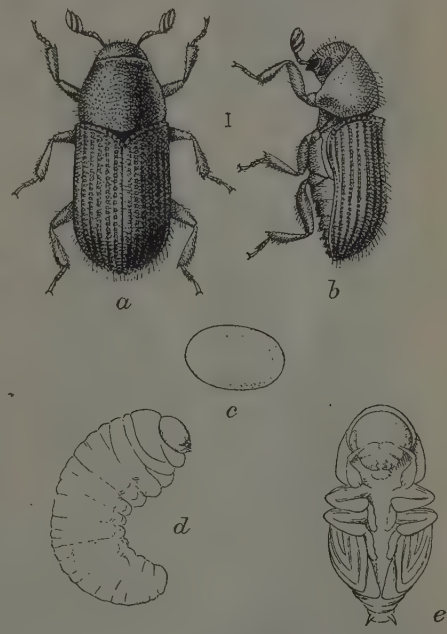


FIG. 7. — The peach-tree barkbeetle (*Phlocotribus liminaris*): *a*, *b*, Adult, or beetle, dorsal and lateral views; *c*, egg; *d*, larva; *e*, pupa. Greatly enlarged. (H. F. Wilson.)

These hibernation cells are made at the inner terminus of burrows averaging about half an inch in length. Often great numbers of such burrows are made in growing trees, and during the following season there will be a copious exudation of gum from the numerous wounds similar to that caused by the fruit-tree barkbeetle (see fig. 5). The beetles, after leaving their hibernation quarters in the spring, make short burrows in healthy trees, either to obtain food or in an attempt to form brood chambers. The constant flow of sap from such wounds eventually weakens the trees to such an extent that brood chambers can be constructed without interference from

gum formation, after which the larvæ make short work of the trees.

The beetles leave their hibernation cells early in the spring and migrate to other trees, brush heaps of prunings, or any suitable wood wherein eggs can be deposited. The female bores into the bark, forming a hole very similar to that made by the fruit-tree barkbeetle, but distinguished from it by the particles of excrement, held together by fine threads of silk, which partly fill the mouth of the burrow or hang therefrom. The brood chamber (see figs. 8, 9) may be anywhere from 1 to 2½ inches in length. It may be told at a glance from that of the species described previously by the fact that almost invariably it is made to cross the grain of the wood transversely, instead of extending parallel with it, and that there is a short side tunnel branch

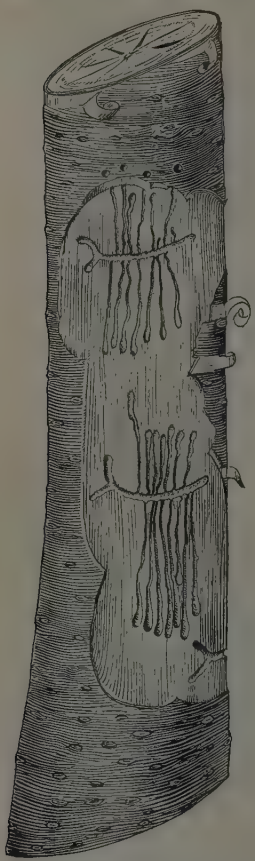


Fig. 8.—The peach-tree barkbeetle in wood of peach tree: Brood chambers and larval galleries. (H. F. Wilson.)

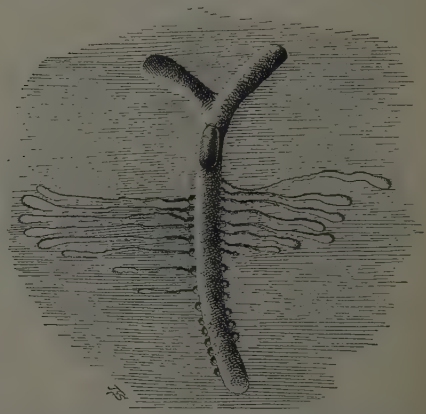


Fig. 9.—The peach-tree barkbeetle: Brood chamber with egg pockets and larval galleries in wood of peach tree. Lakeside, Ohio, May 18, 1908. Enlarged. (H. F. Wilson.)

ing from the main chamber near the inner end. This side branch enables the female to turn around within the burrow and is occupied by the male at the time of mating.

The small, white eggs (fig. 7, *c*) are deposited in little pockets excavated from the walls of the brood chamber (see fig. 9), from

80 to 160 eggs being placed by a female in a single chamber. Eggs (fig. 7, *c*) from the first generation of beetles require from 17 to 20 days to hatch. The larvæ (fig. 7, *d*) bore at right angles away from the brood chamber, forming burrows from 1½ to nearly 3 inches in length. They are white, often with a pinkish cast due to the contents of the digestive tract, and have a yellowish head and darker mouth parts. In from 25 to 30 days they attain full growth and then pupate within the bark. From 4 to 6 days are passed in the pupal stage (fig. 7, *e*), after which transformation to beetles takes place. The adults of this generation issue about midsummer (see fig. 10) and provide eggs for a second generation, the beetles of which appear in the fall and hibernate as has been described. During the summer and fall the two generations overlap so that all stages of the insect may be found in trees at one time.

FIG. 10.—Exit holes in peach limbs made by adults of the peach-tree barkbeetle. Natural size. (Original.)

CONTROL OF THE FRUIT-TREE AND PEACH-TREE BARKBEETLES.

The first and most important point in connection with the control of these two species of barkbeetles is the elimination of breeding places. As has been shown, both species breed only in unhealthy wood, and where there is an abundance of such wood they will multiply in numbers limited only by the food supply. Trees and branches affected as follows have been observed to be favorite breeding places: Trees dying from neglect and starvation, from attacks of the San Jose scale, infection of "yellows," injury to roots and base of trunk by mice and rabbits, injury by blight and sun scald, and other diseases of roots, trunk, and branches, and injury by round-headed apple-tree borers; trees whose branches have been broken down by storms or loads of fruit, or any agency or condition that will cause unhealthy or dying wood. (See figs. 11 and 12.) Such wood should always be eliminated, either by restoring it through

proper treatment to a normal and healthy condition or by burning. Not only must such wood be guarded against within the orchard, but a lookout should be maintained of land adjacent to orchards,

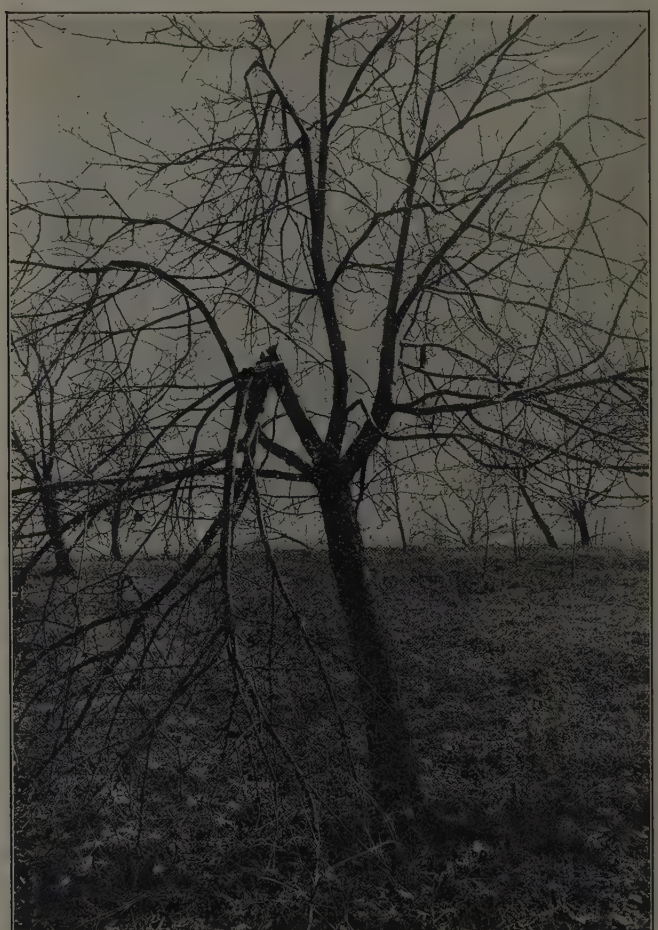


FIG. 11.—Branches of apple tree broken by overbearing. The fruit-tree barkbettle was breeding in great numbers in the broken branches. (Original.)

where sickly seedling apple, peach, wild cherry, wild plum, serviceberry, crab apple, or other trees susceptible to infestation may form breeding centers for the beetles. Where all such breeding places can

be removed the danger of attacks by the beetles on healthy trees will be reduced to the minimum.

Trees of stone fruits, like peach, plum, and cherry, which are infested and from which the gum still exudes may often be saved

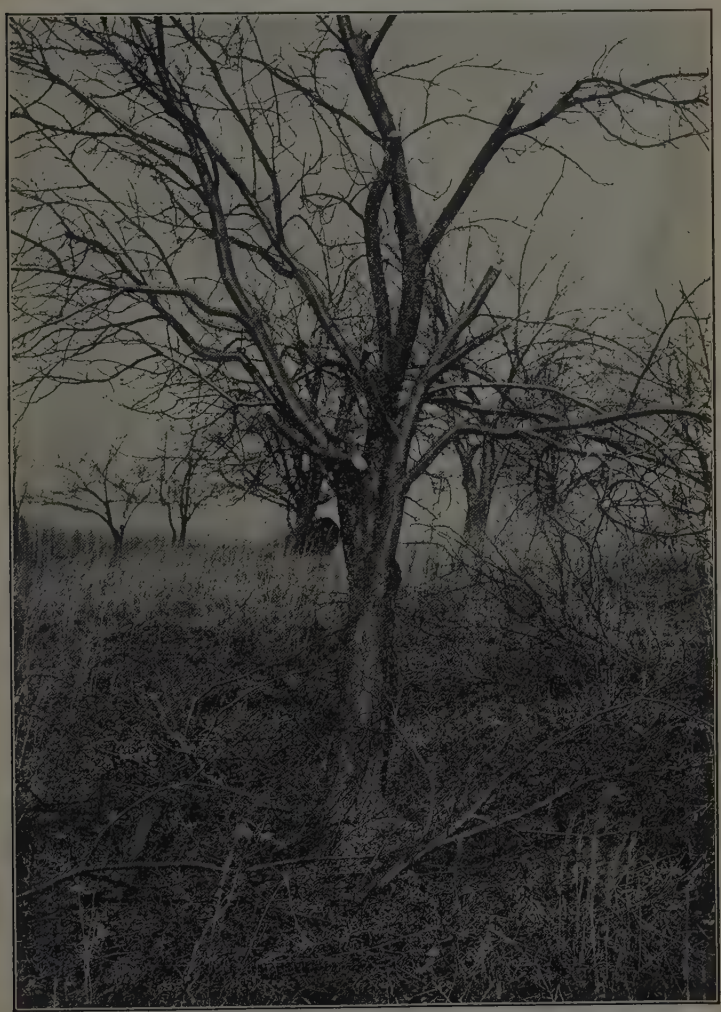


FIG. 12.—Branches left lying on the ground under a top-worked apple tree. Numbers of the fruit-tree barkbeetle were breeding in these branches. (Original.)

by the prompt application of remedies. They should first be cut back severely and then the soil about them cultivated and dressed liberally with barnyard manure or commercial fertilizer. This will stimulate growth and assist the tree in overcoming the injury. A thick

coat of whitewash (fig. 13) should then be applied. In cases of serious infestation it may be necessary to apply as many as three

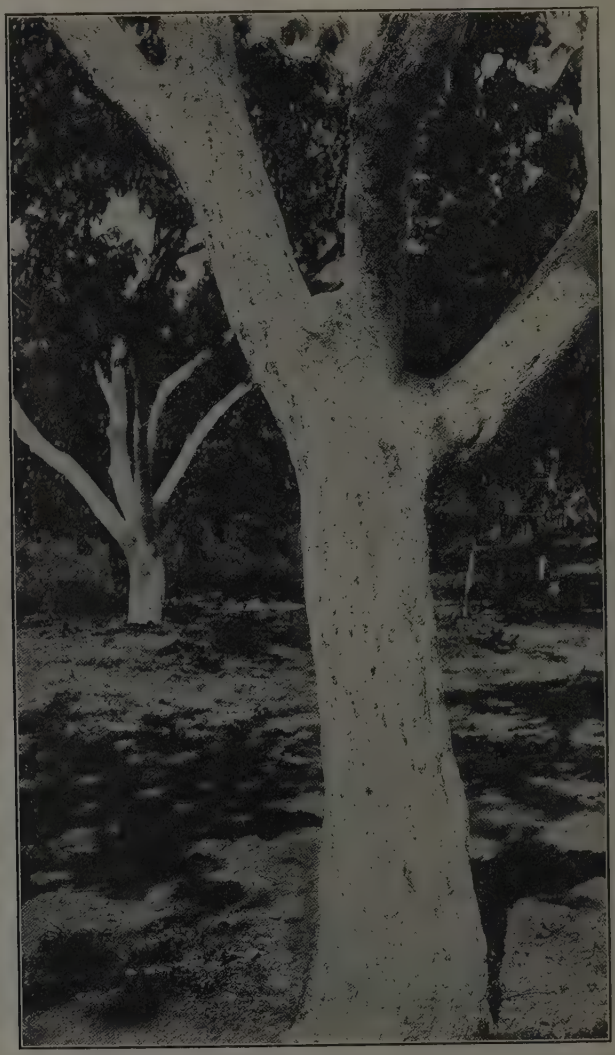


FIG. 13.—Peach trees treated with whitewash to combat the fruit-tree barkbeetle. (Original.)

coats of the whitewash during the season—one early in the spring, another about the middle of summer, and a third in the fall. If

the whitewash is mixed thin enough for application with a spray pump, two sprayings made about the same time will be necessary to supply a protective covering to the bark. If the mixture is made thicker, a single coat applied with a broom or brush will be sufficient for one time. The addition of a handful of table salt to each pail of whitewash will render the application more adhesive. Good results have been obtained by mixing a pint of crude cresylic acid with each 10 gallons of the whitewash.

The whitewash will not kill the insects already in the trees, but if a solid coat is maintained on the bark it will prevent in a large measure the laying of additional eggs and enable the trees, by the help of cultivation and fertilizers, to recover from the injury.

Many other washes, paints, and sprays have been tested against these insects, but when the cost of material, simplicity of preparation, and effectiveness are considered, nothing has been found that can be recommended as preferable to whitewash when prepared and used as directed above.

FIG. 14. — The apple wood-stainer (*Monarthrum mali*): Adult, or beetle. Much enlarged — natural size in small circle. (Original.)

THE APPLE WOOD-STAINER.[1]

The small wood-boring beetle known as the apple wood-stainer (fig. 14) derives its name from the fact that it stains the walls of its burrows black by propagating thereon a moldlike fungus on which it and its larvæ feed. This interesting habit is possessed by several related species, and the name "ambrosia beetles" has been given to the group on that account. Frequently the wood surrounding the burrows is stained a dark color as a result of the fungous growth.

The adult apple wood-stainer (fig. 14) is about one-tenth of an inch long and is reddish-brown to nearly black. In form it is cylindrical and slender, and it does not differ greatly in appearance from the barkbeetles described previously. A score or more of food plants have been recorded. These include forest and orchard trees, casks in which wine and other liquids are stored, and manufactured mahogany lumber. Among fruit trees it is known to attack apple, plum, cherry, and orange. About 50 years ago it attracted attention as an enemy of apple trees in Massachusetts, where it is said to have riddled the trunks of many young trees. Associated with this species

[1] *Monarthrum mali* Fitch; order Coleoptera, family Ipidae.

is found another, *Monarthrum fasciatum* Say (fig. 15) of similar appearance and food habits.

FIG. 15. — *Monarthrum fasciatum:* Adult, or beetle. Much enlarged. (Original.)

The female beetle bores through the bark and into the wood for a short distance and deposits her eggs. Later the short larval galleries are constructed outward from the main gallery made by the parent beetle. (See fig. 16.) Breeding takes place only in diseased, dying, girdled, and felled trees.

The insect is not a common orchard pest, but should it occur at any time in injurious numbers the remedies recommended herein for barkbeetles may be resorted to.

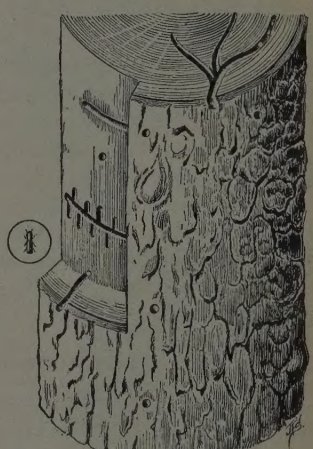


FIG. 16.—Work of the apple wood-stainer (*Monarthrum mali*) in apple wood. Beetle, approximately natural size, at left. (Original.)

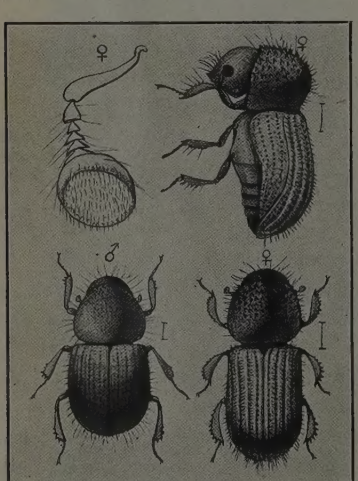


FIG. 17.—The pear-blight beetle (*Anisandrus pyri*) : Adults, or beetles, and enlarged view of antenna of female beetle. All much enlarged. (Hubbard.)

THE PEAR-BLIGHT BEETLE.[1]

The pear-blight beetle (fig. 17) has been the cause of occasional injury to fruit trees for many years. It bores into the twigs and branches of apple, pear, peach, and plum trees and causes a dying back of the wood, the injury resembling that of the bacterial disease common on apple and pear, known as pear blight or twig blight. The insect also attacks the trunks of trees and is not confined to orchards, but infests a number of hardwood forest trees, and at least

[1] *Anisandrus pyri* Peck; order Coleoptera, family Ipidae.

one cone-bearing tree. Like the other species considered in this paper, it prefers to work in diseased and dying wood, although, as has been indicated, healthy trees are sometimes attacked. The species is distributed widely in the eastern part of the United States.

The female beetle (fig. 17, upper and lower right) is about one-eighth of an inch in length, of a dark-brown color, and has the head hidden from above by the projecting front of the thorax. The male beetle (see fig. 17, lower left) is only about half as large as the females. The adult female, when attacking twigs, usually makes her entrance at the base of a bud. The burrow (fig. 18) extends to and around the pith and has a number of short side branches running with the grain of the wood. Eggs are deposited loosely in the burrow and the larvæ feed on the ambrosia fungus which is propagated on the walls. The larvæ transform to adults within the burrow made by the parent beetle and issue from the tree through the entrance hole. Small branches are killed by these burrows, but when the beetles enter large branches or the trunks of trees the injury is not serious, and, as has been stated, more often than otherwise only unhealthy wood is entered. Injuries caused by twig blight and by these beetles are sometimes similar in appearance, but there is no relationship between the two troubles, and orchardists should be able to distinguish the insect injury from the blight by a close examination of the twigs.

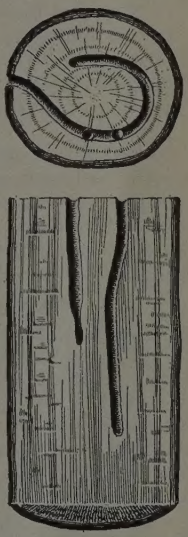


FIG. 18.—Gallery of the pear-blight beetle in poplar twig: Upper figure, transverse section; lower figure, longitudinal section. (Marx.)

Where remedial measures are called for, the methods recommended for use against the other species described herein should be adopted, with the additional precaution of cutting out and burning the infested twigs.

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